

Remarks

Claims 1-15 are currently pending in this application, with claims 1 and 9 being amended by this Amendment.

The Office Action required corrected drawings; and rejected claims 1-15 under 35 U.S.C. § 103(a) as being unpatentable over Bache (U.S. Patent No. 4,979,992) in view of Owen et al. (U.S. Patent No. 6,023,980) and further in view of Tse (U.S. Patent No. 4,662,228).

Pursuant to the Office Action, Applicants have provided replacement sheets of drawings which include Figs. 3-6. The replacement sheets replace the original drawing sheets including Figs. 3-6, and incorporate the proposed drawing corrections set forth in the attached annotated sheets.

Applicants respectfully traverse the Section 103(a) rejections of claims 1-15 for the following reasons. As set forth in the Background section of the Specification of the present application (pages 1 and 2), several macromechanical testing techniques have been developed to test the ballistic and impact properties of composites under dynamic loading conditions (i.e., under high strain rates), as well as quasi-static loading conditions. Such dynamic macromechanical testing techniques include the Hopkinson bar, gas gun, plate impact, and weight drop techniques. Macromechanical test techniques, such as short beam shear and flexural bending, have been used to characterize fiber/matrix interphase, but only under quasi-static conditions. However, these techniques fail to directly obtain interphase-related data or to isolate the effects of interphase because mechanical loading applied to the composite induces complex stress states within the fiber/matrix interphase that are not well defined.

Micromechanical testing techniques that can directly characterize the interphase properties have been developed, but are also limited to testing interphase properties under quasi-static loading

conditions. Such micromechanical techniques include the single fiber fragmentation, fiber pull-out, and microindentation techniques.

None of these conventional techniques disclose a micromechanical test technique that can directly characterize the interphase properties under dynamic (high-strain rate) loading conditions. The prior art relied upon in the Office Action verifies this assertion.

Bache, the primary reference relied upon in the Office Action, discloses strengthening of concrete beams that are subjected to bending loads using reinforcements such as steel, composite rods, or fibers. Such concrete beams may be used for buildings, bridges, and other infrastructure applications. Bache fails to disclose a dynamic interphase-loading apparatus (DILA) and a method for testing the mechanical properties of an *interphase region of a fiber/matrix composite* under *dynamic loading* conditions, as set forth in claims 1-15 of the present application. Thus, Bache discloses nothing more than the conventional macromechanical testing techniques as set forth in the Specification of the present application.

The other two references relied upon in the Office Action likewise fail to disclose an apparatus or method for testing the mechanical properties of an interphase region of a fiber/matrix composite under *dynamic loading* conditions. Owen et al. disclose a high-cycle fatigue testing machine for testing materials such as metal alloy matrix materials and metal-ceramic matrix materials. Owen et al. are silent with regard to testing the mechanical properties of an interphase region of a fiber/matrix composite. Like Bache, Owen et al. disclose nothing more than the conventional macromechanical testing techniques as set forth in the Specification of the present application.

Tse discloses an automated testing system that tests the bond of reinforcing fibers in

reinforced polymer composite members. Tse primarily focuses on targeting the fibers in the composite members, but fails to disclose an apparatus or method for testing the mechanical properties of an interphase region of a fiber/matrix composite under *dynamic loading* conditions. Thus, Tse discloses nothing more than conventional micromechanical testing techniques, under quasi-static loading conditions, as set forth in the Specification of the present application.

In contrast to the conventional macromechanical and micromechanical testing techniques set forth in the Background section of the Specification and prior art applied by the Office Action, the present invention recited in claims 1-15 recites an apparatus or method for testing the mechanical properties of an interphase region of a fiber/matrix composite under *dynamic loading* conditions. Thus, even assuming, *in arguendo*, Bache is properly combinable with Owen et al. and Tse, the combination still fails to disclose an apparatus and method for testing the mechanical properties of an interphase region of a fiber/matrix composite under *dynamic loading* conditions, as set forth in claims 1-15 of the present application.

Furthermore, Applicants believe that the Office Action has used impermissible hindsight to justify the combination of Bache, Owen et al., and Tse. There is no disclosure in either Bache, Owen et al., and Tse suggesting that these references may be combined. This alone makes the obviousness rejection improper. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929 (Fed. Cir. 1984) (obviousness cannot be established by combining the teachings of the prior art to produce the claimed inventions, absent some teaching, suggestion or incentive supporting the combination). Recently, the Federal Circuit strongly reiterated this point in *In re Sang Su Lee*, 2002 WL 77144 (Fed. Cir. 2002). In *Sang Su Lee*, the Court held that the PTO must give full reasoning as to what motivation or teaching in the prior art would suggest combining references

relied on in an obviousness rejection; and that an Examiner's general common knowledge and common sense do not substitute for the authority required by law to reject a claim for obviousness.

Without a motivation to combine these references, the Office Action relies upon several erroneous assertions, with all due respect, in an attempt to combine the references. According to the Office Action, it would have been obvious include the teachings of Tse (which discloses conventional testing of a fiber/matrix composite, but does not disclose dynamic loading) with Bache (which discloses conventional testing of concrete structures) and Owen et al. (which discloses a conventional high-cycle fatigue testing machine for testing materials such as metal alloy matrix materials and metal-ceramic matrix materials) to arrive at the claimed invention. There is nothing in these references suggesting an apparatus or method for testing the mechanical properties of an interphase region of a fiber/matrix composite under *dynamic loading* conditions, without reference to the present application. Thus, the Office Action's assertions merely represent the Examiner's general common knowledge and common sense. Such common knowledge and common sense cannot substitute for the authority required by law to reject a claim for obviousness. In light of this, Applicant respectfully asserts that Bache, Owen et al., and Tse are not properly combinable.

In light of the above, Applicants believe that claims 1-15 are patentably distinguishable over Bache, Owen et al., and Tse, whether take alone or in any viable combination. Thus, Applicants respectfully request the reconsideration and withdrawal of the Section 103(a) rejections of claims 1-15.

In view of the foregoing amendments and remarks, Applicants respectfully request the reconsideration of this application and the timely allowance of the pending claims.

If there are any other fees due in connection with the filing of this response, please charge the

Application No. 09/528,379
Amendment dated December 22, 2003
Reply to Office Action of August 22, 2003

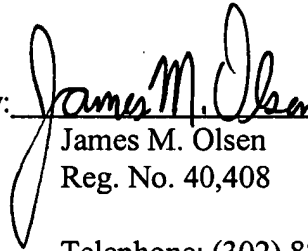
fees to our Deposit Account No. 03-2775. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

CONNOLLY BOVE LODGE & HUTZ LLP

Dated: December 22, 2003

By: _____

A handwritten signature in black ink, appearing to read "James M. Olsen", is written over a horizontal line.

James M. Olsen
Reg. No. 40,408

Telephone: (302) 888-6256
Facsimile: (302) 255-4256